

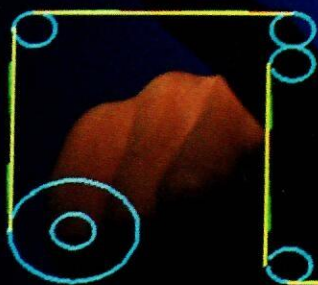
MANUFACTURING Systems

THE MANAGEMENT MAGAZINE OF INTEGRATED MANUFACTURING

Lending Expertise to Control

Raw Material

Granules



Extrusion



Worm Gear Speed
Paste Temperature
Conveyor Speed

1013 RPM
163 deg C
81 cm/min

Heater

Temperature 166 deg C
Heating Time 40 sec

Press

Pun
Pres

xfoil_werk_w

XYZ Manufacturing Co.

RCAP Process Monitoring
--20-00-1000-- 10/93

District A: Molding

District B:

District C: Maintenance

Quit

Tera_1	RTAP	waistline.B	PtSelector	verformans
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■ CALS UPDATE

■ TRAINING AND EDUCATION

From Classroom to Plant Floor to Bottom Line

Training shouldn't be standalone. It must be carefully planned, so that skills learned in classrooms are found to have application on the plant floor.

John R. Costanza
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According to the October, 1992, issue of *Training Magazine*, American manufacturers annually plunk down approximately \$45 billion in pursuit of employee training and education. An employee's educational goals can range from improving performance to training for new jobs. Management often has different objectives, including increasing plant safety, establishing a common corporate culture, or improving the manufacturing process. However, for the investment to be worthwhile, education must not be limited to the classroom.

A three-stage process of education, implementation and formalization brings tools from the classroom into every department in the company. Education involves classroom training where employees learn the manufacturing-based tools of the new technology. Implementation entails discrete phases that bring the technology into the factory. Formalization maintains the technology, often through use of computer software.

If you ask, "Why educate?" the answer is that education provides the foundation by which management and employees begin to understand concepts and tools that will improve the manufacturing process. With education, companies invest in people—just as they invest in equipment.

Companies perform preventive maintenance to avoid future problems. Training is similar; we prepare employees for change. If we only look at the bottom line, we might say that



Education at the Worldwide Flow Colleges emphasizes hands-on learning. Here students rearrange a manufacturing line.

preventive maintenance doesn't make sense. But our goals must extend beyond each month's bottom line. If this is not acceptable, then training is not a priority.

An holistic approach

Educational programs should embody a business strategy that impacts the entire organization. An educational program can emphasize improvement in one particular area of the manufacturing process and produce some improvement. But if the entire business doesn't step forward every time one department takes a step forward, there is a problem. In fact, improvement in one area alone can be detrimental to the entire company. "A little bit of this and a little bit of that" usually produces a little

bit of results.

Why must senior management buy into the training process? A complete training program represents a large investment in people, in time and, potentially, in equipment. Top-down directives are the only way to really make changes quickly. The best education and implementation programs require an up-front investment. It is important to pin down long-term goals to avoid compromising the implementation and results.

Wiggins Connectors, Los Angeles, manufactures component parts for commercial and military aircraft, and for off-road equipment including haulers, dozers and dumpers. In 1991, Wiggins made a commitment to transform the company. Malcolm Flowers, total quality manager, says, "As with any change that impacts an entire company, success is dependent upon a commitment from the top."

To ensure a good return-on-investment in people, training must be given priority status. When the management directive is, "Go to training, but you'd better get your production done today," employees will respond to the most urgent demands placed on them. If companies want training to work, it must be *the* priority.

The investment in time must be equally recognized. Some time will elapse before companies see measurable improvement from educating employees. The training process is a commitment, with work at every stage. Senior management must comprehend the long-term goals, acknowledging that there may be a period of time when productivity suffers. The ultimate goal is not productivity; it is better customer response and lower cost of product.

Taking steps

Should management attend classes? An educational program that radically changes the entire manufacturing process affects all departments in a company. This means that the company president and senior management must understand the changes that will occur. They need to understand what is going on—for support, for resources, for an overall understanding of the business strategy. CEOs, vice presidents of human resources, directors of sales or market-



Lifescan has gone through the phases of education, implementation and formalization to improve the company's response to customer requirements. In-line kanbans help ensure that products flow during manufacturing. Method sheets include visual cues that provide total quality control.

ing, design engineers, production specialists—all employees should learn together.

Should the training occur on- or off-site? There are pros and cons to each approach. With an on-site training effort, instructors are able to custom-tailor training examples to the needs of employees at that specific facility. But the list of negatives regarding on-site training is somewhat larger. Often it is difficult for managers and employees to completely free themselves from their jobs when they are on-site. This results in numerous interruptions and, therefore, a lack of concentration on the training.

Getting away from the plant and into a learning environment with professionals from other companies is useful. It offers an opportunity to network with others who may have useful insights. It's amazing how much people can learn from those whose company's products aren't even related to theirs. It helps people get away from the mind-set that their problems, products and situations are unique.

How people learn should not be overlooked. Education must emphasize concepts that are practical. Real-life examples, case studies and hands-on training help solidify principles learned in the classroom. Interactive education where students learn by

doing is always effective. It puts education into practice.

Think of it as an airplane pilot using a simulator. A simulator is not a plane, but pilots learn a lot using simulators. When education is based on verbal instruction and use of texts, people tend to forget what they learn. However, by using techniques and tools on a real product, learning is crystallized. Then, when the need arises, the hands-on example has meaning.

The name American Standard is recognized in both consumer and industrial sectors. It has approximately 32,000 employees working in three divisions: Trane, which manufactures air-conditioning equipment; Wabco, which manufactures air braking systems for commercial vehicles; and Plumbing Products, which makes toilets and fixtures, and materials for showers and bathtubs.

A major training and implementation effort began in 1990 when the company decided to implement flow manufacturing in its facilities around the world. Today approximately 50 percent of the employees have received training. Dick Wyka, director of demand-flow technology for the Americas and Far East, is responsible for coordinating the successful conversion of 11 American Standard facilities. Commenting on the value of

hands-on training, Wyka says, "The course structure should be such that students actually put the techniques into practice. These are the principles we take to the factory and put into effect."

After education

Implementation brings the technology of the classroom directly into the factory. It represents the "real-world" application of the tools learned in the education phase. The time between education and implementation should be as short as possible. It is critical that senior management involved in the training establish a plan that allows employees to move quickly from education into implementation.

If employees come to class with the understanding that they will use the information/tools when they get back to their jobs—that education is not merely for intellectual development—they learn quickly and well. An implementation plan should take this into consideration.

When do you start applying classroom tools in the factory? Implementation begins when you have a team of properly educated people. The larger the percentage of trained employees, the easier implementation becomes. Additionally, a larger percentage of trained employees helps create champions who will spread the gospel of the new technology.

Wyka agrees that success in the factory is achieved once a group of employees is trained. "We start out by ensuring that the involved facilities have a core group of people," he says. "These people then become the implementation team at the plant level. They are involved in the collection of data, final line design, rearranging facilities and actual line start-up. They are also responsible for formalization."

An implementation team in one production area consists of approximately 10 to 12 cross-functionally trained people. You need production, quality, design engineering, plant engineering, human resources, sales and marketing, purchasing and finance personnel. In other words, a cross-section of employees from all departments.

At first, emphasis is on activities in

the production, quality and process engineering departments. As implementation proceeds, the emphasis moves away from operational groups to support groups. Develop a team with people from different departments, then select a team leader. Focus on change by initially changing the manufacturing floor.

The entire team needs to be involved throughout the process. Of course, some members will be much more involved during one phase of implementation versus another. It would be a mistake to wait until the last phase of implementation before deciding how other departments will be involved.

Wiggins Connectors organized implementation teams comprised of staff from various departments. "We formed teams, started with some simple products and went on to mixed-model lines," notes operations manager Balasubramani Ganesh. "Operators and people in the shop got involved in the planning stage itself, then went into implementation. Now we are working on company-wide implementation. There is linear integration. The employees love it; they become part of the decision-making process."

The entire team needs to be involved throughout the process.

Formalization involves integrating computer technology and application software to help ensure consistent results. It verifies that the newly implemented procedures will continue to be adhered to, and allows managers to expand the scope of their operations or add new product lines without difficulty.

Formalization is especially critical for companies that have large or diverse operations. It guarantees that



Using computer technology, formalization ensures that the new manufacturing process will continue to be successful. A LAN-based system connects all departments into the process.

everyone uses the same tools and achieves the same results. It is also an insurance policy that lets senior management know that even if certain employees leave the company, the process itself remains intact, running smoothly.

Lifescan, a wholly owned subsidiary of Johnson & Johnson, manufactures blood glucose monitoring devices. With formalization, Lifescan integrated marketing, forecasting, production, shipping and receiving on a computer local area network (LAN) of about 15 to 25 nodes.

"The only way you can retain and consistently use the tools learned in the classroom is to formalize the process," says Paul Difraia, director of instruments operations. "If I forget parts of the technology a year or two from now, computer formalization will keep us on a straight line. Computer technology puts the mathematics-based portion of manufacturing processes into a formal context. It is also a reference system and it helps bring new people into the system."

A similar view of the value of formalization comes from Cyril Gallimore, vice president of systems

and technology at American Standard. He says, "I don't think you could achieve success without a structured process that includes education, implementation and formalization. As you implement [more flow lines] in a plant, there is a greater need for software support for the technology. There is a massive amount of data, a lot of calculations that have to be done."

As implementation and formalization spread throughout a company, the process impacts more and more people. The 10 to 12 people initially involved with the implementation team are not enough. At every point in the process, who needs to be educated and what they need to learn must be determined.

The decision to change as part of an overall business strategy is a significant one. Begin with education, but remember that education, implementation and formalization are all important. Without implementation, which is the application of education, education is meaningless. Without formalization, which comprises methods of handling implementation, implementation is useless. 